Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS 0625/3

PAPER 3

MAY/JUNE SESSION 2001 1 hour 15 minutes

Candidates answer on the question paper.
No additional materials required.

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
TOTAL	

This question paper consists of 14 printed pages and 2 blank pages.

[Turn over

1 Fig. 1.1 shows the speed of a small, very dense object which is falling vertically from an aeroplane, up to the point at which it hits the ground. The air resistance on the object is negligibly small for the first 5 s of its fall. The object is fitted with a parachute which springs open after a certain time of fall.

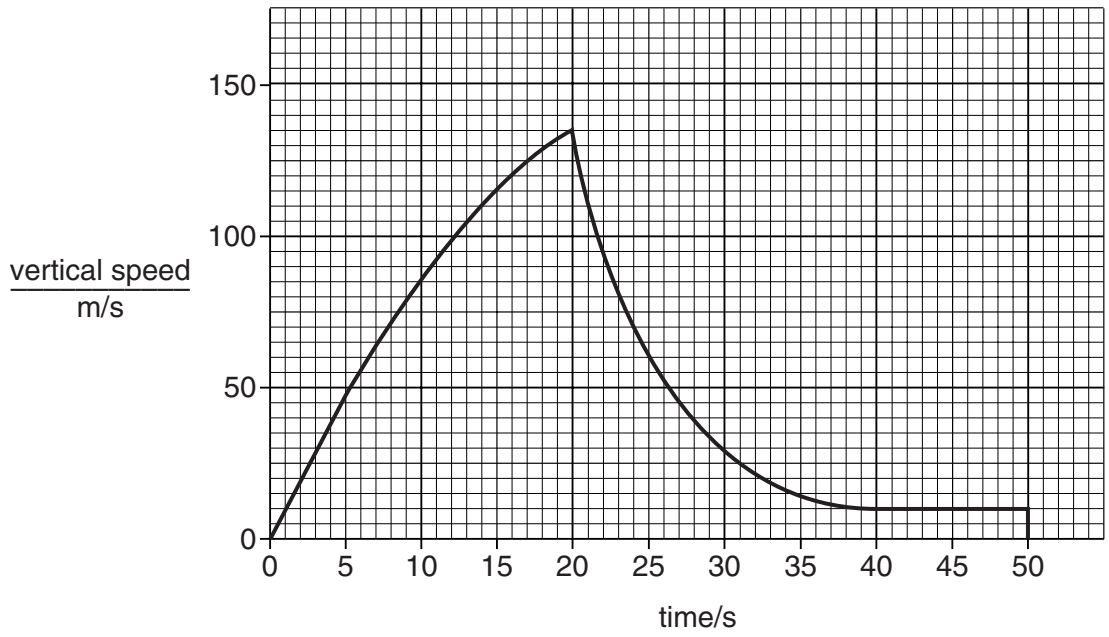

Fig. 1.1

(a) State the type of motion

(i) between 0 and 5 s,

.....

(ii) between 42 s and 47 s.

.....

[2]

(b) Estimate the time at which the parachute opens.

.....[1]

(c) On Figs 1.2 and 1.3, indicate by labelled arrows the vertical forces acting on the falling object

(i) after 3 s of fall,

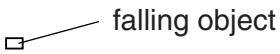

Fig. 1.2

(ii) after 45 s of fall.

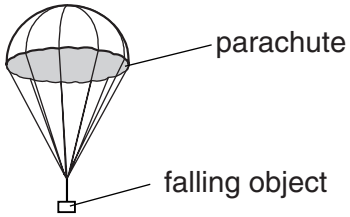

Fig. 1.3 [3]

(d) State whether or not there is a resultant vertical force acting on the falling object

(i) after 3 s of fall,

.....

(ii) after 45 s of fall.

.....

[1]

(e) Calculate the distance fallen in the first 5 s of fall.

distance fallen = ...[2]

2 Fig. 2.1 shows a moving car on a level road.

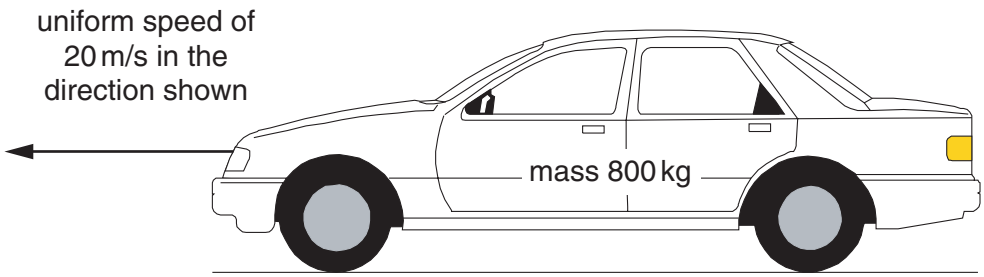

Fig. 2.1

(a) Calculate the momentum of the car.

momentum of car = ... [2]

(b) The brakes of the car are applied for 4 s, which reduces the speed of the car to 5 m/s.

(i) Calculate the average force of the brakes.

average force = ...

(ii) Calculate the average deceleration of the car.

average deceleration = ...
[6]

3 Describe an experiment to find the average density of a small rock sample of approximately 100 g mass.

(a) In the space below draw a labelled diagram of the apparatus.

[2]

(b) List all the measurements which must be taken.

[2]

(c) Explain how to work out the average density from the measurements taken.

.....

.....

.....[2]

4 Fig. 4.1 shows a very magnified view of tiny dust particles suspended in still air, as seen under a microscope.

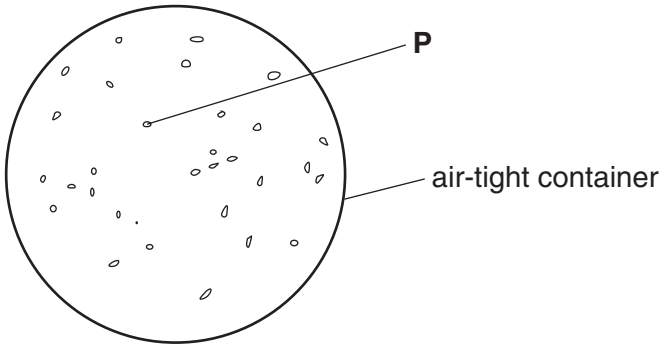

Fig. 4.1

(a) In the space below, draw a diagram to show how the particle labelled **P** would move when it is observed for a short time.

[1]

(b) With reference to dust particles and air molecules, explain the movement which you have drawn.

.....

.....

.....

.....[2]

(c) Describe and explain how the movement would change if the temperature of the air in the container increased.

.....

.....

.....

.....[2]

5 Fig. 5.1 shows apparatus which may be used to find the specific heat capacity of a liquid.

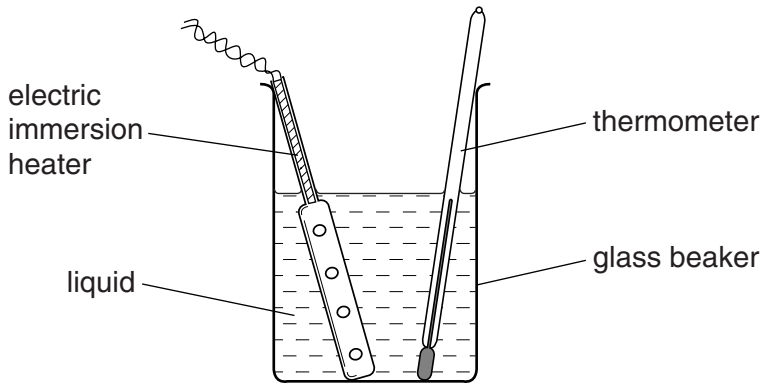

Fig. 5.1

The readings taken are:

power of the heater,	50 W
time heater is switched on,	600 s
initial temperature of the liquid,	20 °C
final temperature of the liquid,	65 °C
mass of the liquid heated,	200 g

(a) Use the data to calculate the specific heat capacity of the liquid.

specific heat capacity = ... [5]

(b) (i) Explain why the value obtained from this data will be higher than the actual value.

.....

.....

.....

.....

(ii) Describe one addition to the apparatus which would make the calculated experimental value nearer to the actual value.

.....

.....
[3]

6 Fig. 6.1 shows some apparatus in use in an experiment to find the critical angle for blue light.

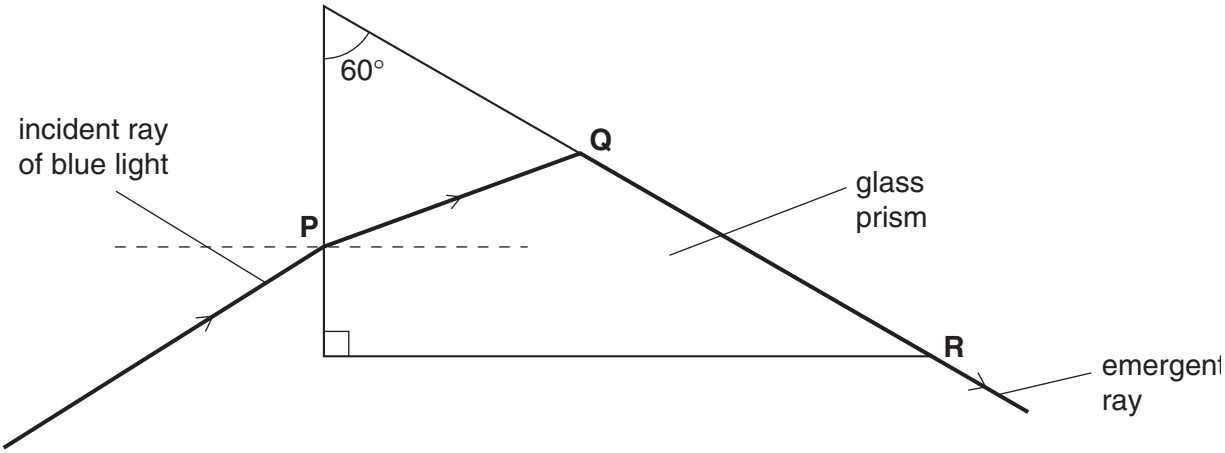

Fig. 6.1

The ray hits the prism at point **P**, then crosses the prism to point **Q**. Part of the ray emerges along the surface **QR** as shown.

(a) (i) By using measurements taken from the diagram, find the critical angle of the glass for blue light.

critical angle = ...

(ii) Use your value to explain how total internal reflection of blue light could be made to occur at point **Q**.

.....

.....

.....

[4]

(b) Using measured angles on the diagram, calculate the refractive index of the glass for blue light.

refractive index = ... [4]

7 Fig. 7.1 shows an unlabelled diagram which a teacher draws to represent a sound wave in air.

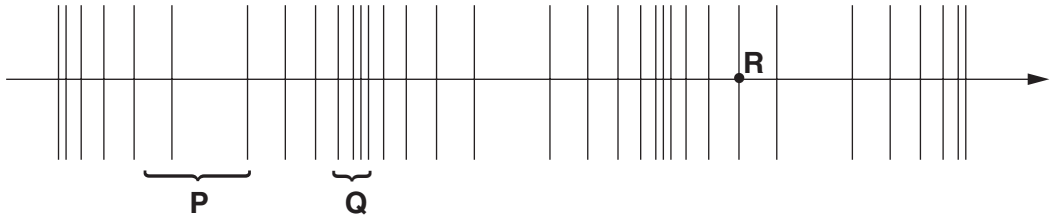

Fig. 7.1

(a) What label should be put on the line with the arrow?

.....[1]

(b) **(i)** What does the uneven spacing of the lines show?

.....

(ii) What is being shown at **P**?

.....

(iii) What is being shown at **Q**?

.....
[2]

(c) Describe the motion of an air particle at **R**.

.....

.....

.....[2]

(d) From Fig. 7.1, measure the wavelength of the sound wave.

wavelength = ... [1]

8 **(a)** Fig. 8.1 shows a coil of thin wire and a lamp connected to a 4 V supply.

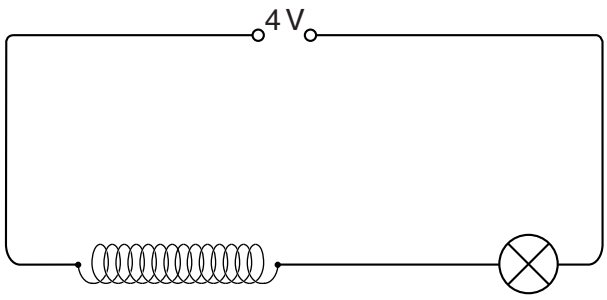

Fig. 8.1

The lamp is marked 1.5 V, 0.6 W. The lamp lights at normal brightness.

Calculate

(i) the current in the lamp,

current = ...

(ii) the resistance of the lamp,

resistance = ...

(iii) the charge flowing through the lamp in 20 s.

charge = ...
[5]

(b) The resistance of the coil of wire shown in Fig. 8.1 is 6.2 Ω and its length is 1.0 m. Using only 1.0 m lengths from the same reel of wire, and without cutting any of them, state how you would produce a resistance of

(i) 3.1 Ω,

.....

(ii) 12.4 Ω.

.....

Complete the circuits in Fig. 8.2 and in Fig. 8.3 to show how the lengths of wire are connected in each case. [3]

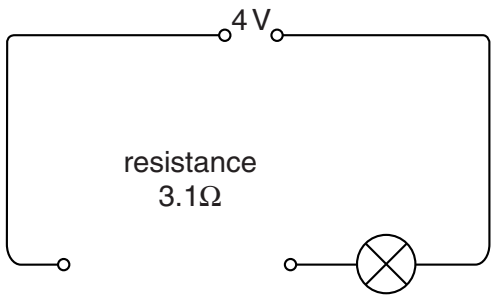

Fig. 8.2

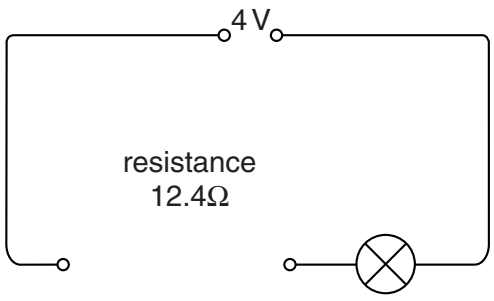

Fig. 8.3

(c) In a similar circuit to that shown in Fig. 8.1, the resistance of the coil is 5.0 Ω and the current through it is 0.6 A.
Calculate the heat energy produced in the coil in 20 s.

energy = ... [3]

9 Fig. 9.1 shows a transformer.

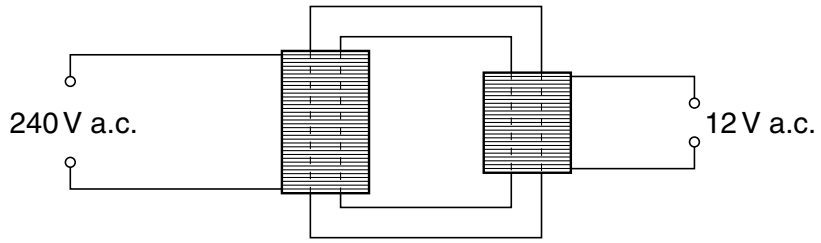

Fig. 9.1

(a) Explain

(i) why a secondary output is obtained even though there is no electrical connection between the primary and secondary coils,

.....

.....

.....

.....

.....

(ii) why there would be no output voltage if the primary coil were connected to a 240 V d.c. supply.

.....

.....

.....

.....

[5]

(b) The transformer is assumed to be 100% efficient.

(i) There are 100 turns on the secondary coil. How many turns are there on the primary coil?

turns on the primary = ...

(ii) The output current is 4.0 A. Calculate the input current.

input current = ...

[4]

10 (a) Complete the following table for α-particles. The first answer has been given.

property/nature	complete this column	
symbol	$^{4}_{2}He$	(hint: it is a helium nucleus)
mass number		
charge		(hint: write down the number of proton charges)
ionisation of gases		(hint: choose from: strong, weak or almost none)
deflection in a magnetic field		(hint: choose from: towards N, towards S or at right angles to the magnetic field lines)
deflection in an electric field		(hint: choose from: towards +ve, towards -ve or no deflection)

[5]

[Turn over

(b) Fig.10.1 shows the paths of α-particles scattered by the nuclei of metal atoms in thin foils.

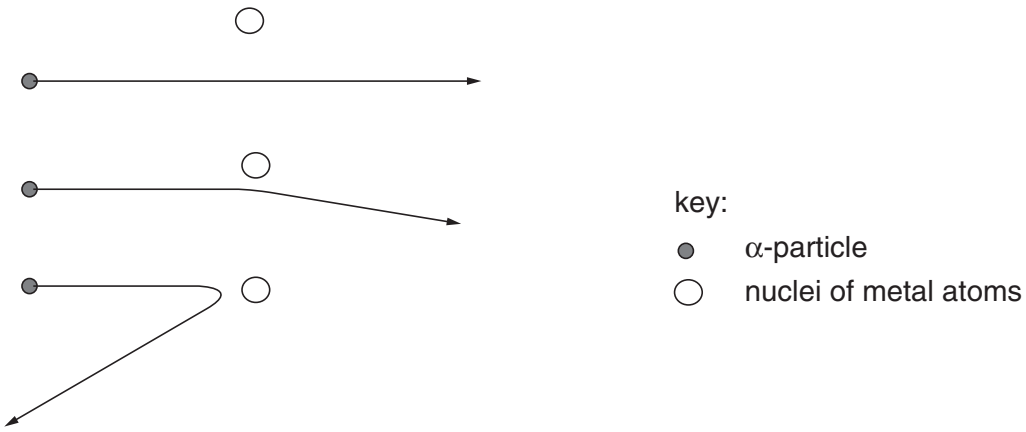

Fig. 10.1

Explain what can be deduced from the paths shown in Fig. 10.1 about

(i) the mass of the nucleus of a metal atom compared to the mass of an α-particle,

.....

.....

.....

(ii) the charge on the nucleus of a metal atom,

.....

.....

.....

(iii) the volume occupied by a metal atom compared to its nucleus.

.....

.....

.....

[5]

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